STUDY OF ANTIBACTERIAL ACTIVITY AND TOTAL PHENOLIC COMPOUND ON FRESH AND POWDERED OF *Zingiber officinale* Roscoe BASED ON DIFFERENT HARVESTING TIME

STUDI AKTIVITAS ANTIBAKTERI DAN TOTAL SENYAWA FENOL PADA Zingiber officinale Roscoe *SEGAR DAN BUBUK BERDASARKAN UMUR PANEN YANG BERBEDA*

BACHELOR THESIS

Submitted to the Faculty of Agricultural Technology in partial fulfillment of the requirements for obtaining Bachelor Degree

By :
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13.70.0082

DEPARTMENT OF FOOD TECHNOLOGY
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STATEMENT OF THESIS AUTHENTICITY

With this I state that Thesis with title "**STUDY OF ANTIBACTERIAL ACTIVITY AND TOTAL PHENOLIC COMPOUND ON FRESH AND POWDERED OF *Zingiber officinale* Roscoe BASED ON DIFFERENT HARVESTING TIME**" there is no work that has been proposed to get academic title on University, and as long as I know there is none work or opinion that had been wrote or published by another people, except that has been writing is referred in this manuscript and mentioned in references.

If someday part or whole of this Thesis is proved and founded as plagiarism, then I deserved to be canceled with any risk of its punishment as the regulation that applicable in Soegijapranata Catholic University and/or the applicable of legislation.

Semarang, March 2017

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SUMMARY

Foodborne diseases that caused by pathogenic bacteria are still a major threat to public health. Foodborne pathogen bacteria require certain processing to inhibit the growth, however this process might cause undesirable flavor or texture to food product. Nowadays, there are a lot of trends that use natural products as the source of antimicrobial agents which is derived from plant's bioactive compounds. Natural bioactive compounds might be effective to kill the foodborne pathogenic bacteria without decreasing the quality of the food. One of them is from *Zingiber officinale* Roscoe. Ginger contains of secondary metabolites, which are flavonoid, phenol, terpenoids and essential oils which has important role as antibacterial agent. Young harvested ginger reported to have higher antibacterial activity than old harvested ginger. Many studies have already reported the antimicrobial properties of *Z. officinale* Roscoe, but limited research about antimicrobial activity analysis based on different harvesting time. The objectives of this research are to observe the antibacterial activity of fresh and powdered ginger based on different harvesting time (3, 4, and 5 months) against *Bacillus cereus* FNCC 0057, *Staphylococcus aureus* FNCC 0047, *Escherichia coli* FNCC 0091, *Salmonella enterica Typhimurium* FNCC 0050, and *Listeria monocytogenes* FNCC 0156 by using well diffusion method. The test followed by minimum inhibitory concentration (MIC) as a quantitative assay. To determine the total phenolic compound as it is one of antibacterial compounds in ginger. The antibacterial testing showed that the increasing of harvesting time will decrease the antibacterial effect. The maximum inhibitory action was found on 3 months old of ginger. MIC test resulted that the smallest concentration of ginger, which is 0.78 µg/ml still can inhibit the entire pathogenic bacteria. It is proved by the formation of clear zone. On the other hand, the increasing of harvesting time will increase the total phenolic compound. Powdered ginger resulted higher antibacterial effect and total phenolic content compared to fresh ginger. This research indicates that young harvested *Zingiber officinale* Roscoe has high potential antimicrobial agent. The antibacterial agent derived from its secondary metabolites, especially the essential oil, terpenoids, zingiberene, and phenolic compounds (gingerol and shogaol).

RINGKASAN

Penyakit dari makanan yang disebabkan oleh bakteri patogen masih menjadi ancaman utama bagi kesehatan masyarakat. Bakteri patogen penyebab penyakit di makanan membutuhkan proses tertentu untuk menghambat pertumbuhannya, namun proses ini dapat menyebabkan perubahan rasa dan tekstur yang tidak diinginkan pada produk pangan. Sekarang ini, terdapat banyak kecenderungan yang menggunakan produk alami sebagai sumber agen antimikrobial yang berasal dari komponen bioaktif tanaman. Komponen bioaktif alami mungkin efektif untuk membunuh bakteri patogen tanpa menurunkan kualitas produk pangan. Salah satunya adalah dari Zingiber officinale Roscoe. Jahe mengandung metabolit sekunder, diantaranya flavonoid, fenol, terpenoid, dan minyak atsiri, yang memiliki perang penting sebagai agen antimikrobial. Jahe pada usia muda dilaporkan memiliki aktivitas antibakteri yang lebih kuat dibanding jahe pada usia tua. Banyak studi yang sudah melaporkan sifat antimikrobial pada Z. officinale Roscoe, namun sedikit penelitian mengenai analisa aktivitas antimikroba berdasarkan usia panen. Tujuan dari penelitian ini adalah untuk mengetahui aktivitas antibakteri pada jahe segar dan bubuk berdasarkan umur panen yang berbeda (3, 4, dan 5 bulan) terhadap Bacillus cereus FNCC 0057, Staphylococcus aureus FNCC 0047, Escherichia coli FNCC 0091, Salmonella enterica Typhimurium FNCC 0050, dan Listeria monocytogenes FNCC 0156 dengan menggunakan metode difusi sumuran. Uji dilanjutkan dengan Kadar Hambat Minimum (KHM) sebagai uji kuantitatif. Untuk mengetahui total senyawa fenol karena senyawa ini merupakan salah satu senyawa antimikrobial pada jahe. Uji antibakterial menunjukkan bahwa dengan meningkatnya usia panen maka akan menurunkan aktifitas penghambatannya. Aktivitas penghambatan terbesar didapatkan pada jahe umur 3 bulan. Uji KHM menunjukkan bahwa konsentrasi terkecil pada jahe, yaitu 0.78 µg/ml masih dapat menghambat seluruh pertumbuhan bakteri . Hal ini ditandai dengan terbentuknya zona bening. Di samping itu, meningkatnya usia panen akan meningkatkan total senyawa fenol. Jahe serbuk menghasilkan aktifitas penghambatan lebih kuat dan total senyawa fenol lebih besar dibandingkan jahe segar. Penelitian ini mengindikasikan bahwa Zingiber officinale Roscoe yang dipanen pada usia muda memiliki potensi kuat sebagai agen antimikrobial. Agen antimikrobial berasal dari metabolit sekundernya, khususnya minyak atsiri, terpenoids, zingiberene, dan senyawa fenol (gingerol dan shogaol).

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I realized that this report is still far from perfect. I am open to any advice and criticism for the improvement of this report. I truly hope that this research could give a valuable contribution in the world of science and be useful to the development of food industries.

Semarang, March 2017

Author,

Fiorency Santoso

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